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THE MEASUREMENT OF LOCUS OF CONTROL IN GIFTED AND NONGIFTED STUDENTS

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The Measurement of Locus Control in Gifted and Nongifted Students

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ABSTRACT

Studies examining the relationship between giftedness and locus of control (LOC) have been inconclusive, and those examining the LOC-IQ relationship have been inconsistent. Three common LOC measures were administered to 176 gifted and 204 nongifted students in grades 3-8 to: 1) determine the relationship of giftedness, sex, age and their interactions to these LOC measures, and 2) explore instrument reliability and factor structure. Primary findings were mixed, with no giftedness main effect and low instrumentation reliability, suggesting possible sources of the inconsistencies in the literature and the need for cautious use of LOC instruments and further development thereof.

Locus of control (LOC) as formulated by Rotter, Seeman, and Liverant (1962) refers to an individual's belief about the degree to which reinforcements are contingent upon his/her own behavior. Internally controlled people believe that they have control over their reinforcements. Externally controlled persons believe that reinforcements are controlled by fate, luck, powerful others, or other outside forces. Reviews of the literature on LOC are available by Joe (1971), Lefcourt (1976), and Phares (1976).

Research concerning the relationship between giftedness and LOC has been relatively limited. The three studies (Fincham and Barling, 1978; Lynne, 1979; and Milgram and Milgram, 1975) that have directly investigated this issue all found gifted children to be significantly more internally controlled than their nongifted peers. Fincham and Barling used the Nowicki-Strickland LOC scale in South Africa, Lynne used three LOC scales with fourth and fifth graders in Ohio, and the Milgrams used a self-developed instrument in Israel. These results would not appear to be conclusive, as the studies are limited not only in number and context, but also in design. For example, as in other LOC studies (e.g., Anshel, 1979; Crandall, Katkovsky and Crandall, 1965; McGinnies, Nordholm, Ward, and Bhanthumnavin, 1974; Newhouse, 1974; Nowicki and Strickland, 1973; and Prawat, Grissom, and Parish, 1979), sex and age may have been significant intervening variables. Moreover, studies which have examined the relationship between LOC and IQ, which is the primary although not exclusive determinant of giftedness in the schools, have produced markedly mixed results. Some

studies (e.g., Bialer, 1961; Powell and Centa, 1972; Stephens, 1971) have found a significant relationship between LOC and IQ. Others (e.g., Hersch and Scheibe, 1967; Kiehlbauch, 1968; Nowicki and Roundtree, 1971; Tolman and Bishop, 1978) have found the LOC-IQ relationship to be nonsignificant. A third group of studies (e.g., Crandall, Katkovsky, and Crandall, 1965; Crandall, Katkovsky, and Preston, 1962; Reimanis, 1973) have reported both significant and nonsignificant IQ-LOC correlations, depending on age, sex, or instrument.

The complicating effects of instrumentation may be at least as important as those of sex and age. The studies that have investigated the intercorrelations among the various LOC instruments (Lynne, 1979; Reimanis, 1973; Stephens, 1971, 1972) have found neither particularly strong nor particularly consistent relationships.

Purpose

In light of inconsistent findings in previous research, the purpose of this study was to determine the relationship of giftedness, sex, age, and their interactions to locus of control as measured by three widely-used instruments. Should the findings under the first objective show inconsistencies, a further purpose was to explore instrumentation issues, such as reliability and factor structure.

Method

Subjects

The subjects were 380 students in grades 3 through 8 in a largely middle-class school district in eastern Pennsylvania. The non-gifted students (n=204) consisted of 92 females and 112 males, with a median age of 11.1 years. Among the gifted students (n=176), there were 69 females and 107 males, with a median age of 10.9 years. The mean IQ for the gifted group was 133.3, and the mean IQ for the non-gifted group was 106.5.

The students in the gifted group consisted of those students who had been identified as gifted learners according to the written guidelines established by the school district. A student who obtains a Full Scale I.Q. of 130 or above on a Wechsler series test (WPPSI, WICS, WISC (R) or WAIS), as appropriate, is considered eligible for the gifted program. The Pennsylvania State standards for gifted placement state: "A limited number of persons with I.Q. scores lower than 130 may be admitted to gifted programs when other educational criteria in the person's profile strongly indicated gifted ability." Other educational criteria include achievement/aptitude scores, grades, and teacher recommendation. Placement of those students with an I.Q. of less than 130 who are considered gifted by the teacher and/or principal is determined by a meeting of a multidisciplinary team.

Data Sources

Three LOC instruments were administered: the Intellectual Achievement Responsibility Questionnaire (IARQ), the Bialer-Cromwell Children's Locus of Control Scale for Children (B-C), and the Nowicki-Strickland Locus of Control Scale for Children (N-S). In the IARQ (20 items) students choose either of two "completions" for each statement. The B-C (23 items) and the N-S (19 items) both require students to respond by selecting a Yes/No answer. The three scales administered are among the most widely used with children in the elementary and junior high grades.

Procedures

The subjects' age, grade level, gifted/nongifted status, and I.Q. were obtained from school district records. First, the Pearson product moment coefficients were computed to determine the relationship among the student variables and among the LOC instrument scores. Second, a three-way MANOVA with the LOC scales as the dependent variables was used. The independent variables were giftedness (2 levels), sex (2 levels), and grade (2 levels - 3rd through 6th and 7th through 8th.*

*Age was not used directly as a covariate due to violations of the homogeneity of regression assumption. Per the practice of other studies (e.g., Milgram and Milgram, 1976), the grade dichotomy was used in place of a nominalization of age, in light of the school district organization.

Univariate comparisons and discriminant analyses were used as post-hoc techniques. Finally, in light of the findings discussed below, internal consistency assessment and exploratory factor analyses using the method of principal factors were employed for each of the instruments.

Results/Discussion

Table I displays the Pearson correlation coefficients among the variables of group, sex, and IQ and the three measures of LOC.

Table I

Correlation Coefficients Among the Variables of Sex, Age, IQ, and the Three Measures of LOC

Variable	Group	Sex	Age	IQ	IARQ	B-C
			Total Sample			
Sex	.06					
Age	-.05	.03				
IQ	.79**	.11*	-.20**			
IARQ	.02	-.02	.05	.00		
B-C	.14**	-.17**	.21**	.13*	.18**	
N-S	.20**	-.07	.17**	.20**	.25**	.46**
			Gifted Subsample			
Age		.00				
IQ		.13	-.28**			
IARQ		-.06	-.09	.06		
B-C		-.21**	.26**	-.08	.15	
N-S		-.12	.12	-.02	.15	.51*
			Nongifted Subsample			
Age		.06				
IQ		.06	-.24**			
IARQ		.01	.15*	-.09		
B-C		-.14*	.18**	.13	.21**	
N-S		-.05	.25**	.15*	.33**	.39**

* $p<.05$
** $p<.01$

These coefficients show that there is not a significant correlation between group status and sex, nor between gifted status and age. Table I includes the intercorrelations among the three LOC scales. In the total sample and the gifted and nongifted subsamples, significant but only moderate correlation coefficients appear between the N-S and the B-C. An even weaker relationship is seen between the IARQ and both the B-C and the N-S, which is not significant in the nongifted subsample. The generally weak correlation coefficients among the three LOC scales as seen in Table I may indicate that these instruments are not always measuring the same learner beliefs or characteristics.

The means and standard deviations of the three LOC measures are reported in Table II.

Table II

Means and Standard Deviations for the Three LOC Scales

Group	IFAQ		B-C		N-S	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Gifted (n=176)	13.88	2.83	15.07	3.17	12.97	3.38
Females (n=69)	14.09	2.76	15.90	2.77	13.46	3.29
Males (n=107)	13.74	2.88	14.53	3.30	12.65	3.41
Nongifted (n=204)	13.77	3.17	14.20	3.08	11.60	3.22
Females (n=92)	13.74	2.99	14.68	3.03	11.79	3.27
Males (n=112)	13.79	3.32	13.79	3.08	11.45	3.19
Total (n=380)	13.82	3.01	14.60	3.15	12.24	3.36

It can be seen in Table II that the gifted females had a higher mean scores on each of the three LOC tests than their male counterparts. The difference between the males and females were not as

strong or consistent within the nongifted subsample as they were in the gifted subsample. Whether these differences or their interactions were significant was examined by a three-way MANOVA, as reported in Table III.

Table III

Wilks Lambda Multivariate Test of Significance for Three-way MANOVA - Three Dependent Variables

Effect	Wilks Lambda	Approx. F*	Significance of F
Group	.985	1.921	.126
Sex	.932	9.034	.000
Grade	.958	5.362	.001
Group X Sex	.999	.083	.969
Group X Grade	.978	2.745	.043
Sex X Grade	.957	5.581	.001
Group X Sex X Grade	.989	1.403	.242

*All F ratios based on 3 and 370 Degrees of Freedom

Univariate F Tests for Significant Main Effects and Interactions

Scale	Sex		Grade		Group X Grade		Sex X Grade	
	F	Sig. of F	F	Sig. of F	F	Sig. of F	F	Sig. of F
IARQ	2.16	.143	.14	.711	2.37	.124	13.14	.077
B-C	25.88	.000	15.48	.000	2.73	.099	14.08	.000
N-S	9.26	.003	5.16	.024	7.05	.008	7.64	.006

The three-way MANOVA and the univariate comparisons yielded the following findings:

1. No main effect for giftedness was found.

2. A main effect for sex was found. The univariate comparison indicated that females were more internalized, primarily on the B-C, and to a lesser degree on the N-S.

3. A main effect for grade was also found. The students in grades 7 and 8 were found to be more internalized, primarily on the B-C, and to a lesser degree on the N-S.

4. There was no giftedness by sex interaction.

5. A giftedness-by-grade interaction was found. This interaction appeared on the N-S, with the giftedness effect (gifted students more internalized) being more pronounced among the younger students.

6. A sex-by-grade interaction was found. This interaction was found primarily on the B-C, with the sex effect (females - more internalized) being more pronounced in older subjects.

7. There was no giftedness-by-sex-grade interaction.

The mixed results by instrument which the three-way MANOVA with three dependent variables yielded indicated a need for further psychometric analyses, as stated in the purpose for this study. Consequently, the alpha coefficient, a measure of internal consistency, was calculated for each of the LOC instruments in the total sample, the gifted subsample, and the nongifted subsample. These results are reported in Table IV.

Table IV

Alpha Coefficients of the Three LOC Instruments

Scale	Total	Gifted	Nongifted
IARQ	.60	.55	.64
B-C	.59	.60	.56
N-S	.67	.70	.61

This Table shows that in the total sample, the alpha coefficients ranged from a low of .59 for the IARQ to a high of .67 for the N-S. The range of alpha coefficients are similarly limited for the two subsamples. These reliabilities suggested a somewhat diverse internal structure which led to a further exploration of the instrumentation issues.

In light of the fact that the above analyses seemed to suggest that the three scales being examined were in fact measuring different characteristics of the subjects, it was felt that some preliminary factor analyses would be appropriate. Accordingly, each of the three scales was factor analyzed within the gifted and nongifted groups for a total of six different analyses. In each case, a principal factor analysis with varimax rotation using the eigenvalue-1 rule for factor retention was used. A factor loading of .4 or better was arbitrarily used to identify "significant" items. The analyses were performed by the SPSS FACTOR subprogram.

Table V

Results of Exploratory Factor Analysis

Scale/Group	No. Factors Pre Rotation	No. Factors Post Rotation	Sig items Factor 1	Sig items Factor 2	Sig items Factor 3	Sig items Factor 4
IARQ						
Gifted	9	2	9,10,13,18	14,16		
Nongifted	8	2	10,13	8		
BC						
Gifted	9	3	6,12	17,20,22	2,21	
Nongifted	9	4	2,21	8,17,18,22	10	4,19
NS						
Gifted	7	2	3,5,13,19	14,16		
Nongifted	7	1	12,14,16			

The preliminary results of Table V suggest a number of possible characteristics of these three scales. First, they are somewhat less than unidimensional. Locus of control, as measured by these instruments, would seem to be a multidimensional attribute. Second, there would appear to be some disagreement among the scales as to how many dimensions are actually involved. Third, there seems to be some evidence that the factor structure within each instrument is not constant across giftedness groups. This all suggests that not only are these scales measuring different constructs from one another (thus giving rise to some of the inconsistencies in the literature) but that any one instrument might be measuring different constructs within gifted as opposed to nongifted subjects (adding further to the confusion).

Admittedly, the factor analyses conducted here were exploratory in nature, and the comparison of their results was extremely subjective. On a more formal level, had the resources been available, confirmatory factor analyses testing the hypothesis of equal factor structures would have been conducted using a program such as COFAMM. These informal findings, however, do tend to support the contention that locus of control research does potentially face a serious instrumentation problem.

Conclusion

The major objective of this study was to investigate the relationship of giftedness, sex, age-grade, and their interactions to

three widely-used measures of locus of control. The findings of no main effect for giftedness, a main effect for sex and grade, and interactions between giftedness-by-grade and sex-by-grade suggest a reason for the inconclusive findings in the literature. The mixed results and the interactions indicate that only qualified statements about the relationship of giftedness and locus of control can be made.

The psychometric analyses in this study and their confirmation of the rather internal diverse structures of these instruments suggest that instrumentation is another source of the inconsistent findings cited in the literature review. The generally low intercorrelation among the three LOC instruments indicates that these scales may not be measuring the same beliefs or characteristics. This lack of consistency from instrument to instrument is due in part to the fact that, at least in this study, they have limited internal reliability. These findings suggest a need for further development of LOC instruments. Also suggested is the need for considerable caution in educational decision making based on the current measurement of locus of control in gifted and nongifted students.

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